MODEL

245 RP

WHEELCO INSTRUCTION MANUAL

instrumentality

FOR ACCURATE PROCESS CONTROL

BARBER COLMAN

Wheelco Instruments Division

BARBER-COLMAN COMPANY, ROCKFORD, ILLINOIS, U. S. A.

UNPACKING THE INSTRUMENT

This Wheelco Instrument and its associated equipment have been carefully packed at the factory. Remove the instrument and its accessories carefully from the packing box and check the part numbers against the packing slip.

CAUTION: Handle with care. Avoid oil accumulation.
Safeguard instrument from shock. Keep instrument temperature under 130° F.

DESCRIPTION

The meter indicates the temperature at the hot junction of a connected thermocouple. Two small flat coils, mounted on the control setting index, are connected to the electronic control circuit. A small metal flag on the indicating pointer will cause a control action as it enters between the two coils.

SPECIFICATIONS

Refer to Specifications on Scale Plate.

(A) Thermocouple:
The type of thermocouple to be used with meter is shown on the scale plate as follows:

C/A - Chromel vs. Alumel
I/C - Iron vs. Constantan
Pt. 13% - 13% Rhodium, 87% Platinum vs. Platinum
Pt. 10% - 10% Rhodium, 90% Platinum vs. Platinum

(B) The external resistance for which the meter has been calibrated is shown at the bottom of the scale pan and is the combined resistance of the thermocouple plus the resistance of the extension lead wire. Length of lead wire may be increased or decreased up to 25 ft. without recalibrating meter.

(C) This instrument will operate on 105-125 volts or 210-250 volts AC depending on which (115 or 230) voltage selector plug is used. Frequency of power supply must be same as shown on rating plate.

(D) The control action is of the H-C-L type, that is, the control circuit relay has SPDT contact action. Rated capacity of the contacts are 10 amperes at 115 volts or 5 amperes at 230 AC for non-inductive loading. For inductive loading, decrease ratings by 50%.

BEFORE INSTALLING

(A) Remove the meter of the Panelmount models from the case by removing the 4-corner screws holding the meter housing and the plug-in connectors. This protects the meter during subsequent handling and installing of the controller case.

NOTE: Step (A) not necessary for models having large cabinet below indicator.

(B) Be sure the line voltage and frequency to be used are the same as shown on the voltage selector plug used and the rating plate.

(C) Make sure that the voltage supplied to auxiliary equipment is correct.

(D) Protect the controller contacts by totaling the current (ratings) required by the controlled auxiliary equipment. This current requirement must be less than shown on the rating plate as maximum contact capacity.

LOCATION

(A) The instrument should be located to avoid vibration, shock, dirt, moisture, oil dripping and temperatures over 130° F. Example: Avoid furnace walls, machine frames, contactor panels, and outside walls.

(B) If the instrument must be installed where severe vibrations occur it is recommended that vibration mounts be used. To keep vibration from being transmitted by the conduit, use Greenfield (BX) adjacent to the instrument.

(C) Glaring reflections on the scale window should be avoided.

MOUNTING

(A) Panelmount models are designed for either flush or surface mounting. A kit containing proper lugs for flush or surface mounting is included with the instrument. Standard Wheelco panels are available for mounting the instrument. These are of sturdy steel construction with a black enamel finish and are available with cut-outs for flush mounting.

(B) Moderate care should be taken to insure that the instrument is mounted level.

(C) See mounting dimension sheet.

WIRING

(A) Be sure the line voltage on voltage selector plug and frequency on rating plate to be used is correct. Voltage selector plug is located on the terminal panel of the instrument. If desired the voltage can be converted by changing voltage selector plugs (only change necessary) from 230 volts to 115 volts.

(B) Refer to suggested external wiring diagrams for typical circuits.

(C) Run all wires in pipe, conduit or Greenfield (BX) over entire length in accordance with local electrical code. Run thermocouple extension lead wire in separate conduit. Wires for TCB (if used) can be run in same conduit with lead wire.

(D) Ground the instrument case. A grounded conduit system is usually sufficient.

(E) Use properly fused switches, as indicated on the diagrams, to protect the instrument.

(F) Use only extension lead wire supplied with the instrument or extension lead wire correct for use with the type of thermocouple specified on the scale. Ordinary copper wire will NOT serve the purpose. Reversed extension lead wires result in wrong readings.

(G) Proper polarity (+) and (-) of the extension lead wire must be observed to obtain true readings. Upscale direction of the pointer movement is not sufficient evidence of correct polarity. Normally, the color coding is indicated on a tag attached to the extension lead wire when shipped. The following procedure definitely checks the correctness of extension lead wire polarity:

1. Connect lead wire to T/C terminals of instrument.
2. Twist free ends together after they have been bared and cleaned.
3. Heat free end with match or soldering iron.
4. If meter goes upscale, polarity is correct. If meter goes downscale, polarity is wrong - reverse polarity at instrument T/C terminals.

(H) The thermocouple should then be connected to the extension lead wire and the pointer should move upscale when the thermocouple hot junction is heated. If the indicating pointer moves downscale, reverse only the connections at the thermocouple head, since the extension lead wire has already been correctly connected to the meter terminals.

(I) Thermocouple Location: The temperature that will be controlled is that of the thermocouple "Hot Junction". The location of the hot junction should be away from the load far enough to be partially affected by the source of heat to reduce overshooting. Most applications require a thermocouple protecting tube because bare thermocouples, used in atmospheres or media causing chemical reaction may deteriorate the couple and destroy the calibration.

(J) If the instrument is equipped with Thermocouple Break Protection feature (TCB) use copper wire (14 ga. satisfactory) to connect the TCB terminals to the connector block in the thermocouple head. (+) terminal should be connected to (+) terminal in the thermocouple head and (-) to (-).

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Instrumentality

ADJUSTMENTS AND CHECKS BEFORE USING

(A). After the instrument case is mounted on the panel, disconnect the shunt wire or link located on the under side of the meter at the (S) terminal, or at (S) terminal on terminal strip. Then place meter housing in the case. This connection electrically dampens the meter movement for protection during installation or handling.

(B). Check meter indication on open circuit. The pointer should come to rest at the ambient (meter) temperature. It is NOT supposed to read zero. The thermocouple circuit can be opened at the terminal strip, Disconnect wire at (+) terminal, make desired check and then replace. Note: On Models 245P and 245RP a thermocouple and meter terminal strip is located just inside the left control section.

(C). If the pointer does not come to rest at the ambient temperature, it should be adjusted by slowly turning the zero adjuster screw (ZERO ADJ.) until the pointer rests at the instrument temperature, as checked by a thermometer with its bulb directly on the meter thermocouple terminals. Reconnect the circuit after the checking is completed.

(D). This instrument is equipped with automatic cold junction compensator. By using extension lead wire from the thermocouple cold end to the meter terminals, the effective cold end is brought to the instrument. The compensator then causes the pointer to follow changes in room temperature eliminating the necessity of changing the ambient (meter) setting.

(E). To check operation of thermocouple break protection (TCB) if instrument is so equipped, disconnect thermocouple from connector block, simulating a broken thermocouple. Pointer should then go upscale past control setting. If pointer goes downscale, TCB leads are open or reversed. This check is to be made with power on the instrument.

(F). Check the auxiliary equipment independently of the controller, after wiring is complete, to guard against faulty wiring and possible damage to the controller contacts.

(G). Close manual fuel valves, or open the furnace heating switch if separate from the control circuit.

(H) Close switch to line supply of the instrument and use one of the control setting knobs (TEMP. SET) to move the red control pointer slowly downscale passed the black temperature indicating pointer. As the pointers coincide, the control action will occur.

(I) Move the red control pointers upscale passed the black temperature indicating pointer. Again at coincision the relay should operate.

(J) If control operation (indicated by clicking of relay and/or pilot lamp operation) does not occur when red control pointer and black indicating pointer coincide, instrument must be tuned. The tuning adjustment screw is accessible by removing the covers on either side of the meter housing. The lower control point tuning adjustment screw is located in left hand chassis just below the pilot bulb. The higher control point tuning adjustment screw is located in right hand chassis just below the pilot bulb. If the control action occurs before the temperature pointer reaches the control set point, turn the tuning adjustment screw slightly to the left. Turn to the right, slightly, to lower the point of control action. Use a small insulated handle screw driver for this adjustment.

OPERATION

(A) The control set points are adjustable by use of the external (TEMP. SET) knobs.

(B) The indicating pointer will move to indicate the temperature of the hot junction of its connected thermocouple. All power for the meter is generated by the thermocouple, no dry cells or batteries are necessary.

(over)

(C) Normal control operation occurs after approximately 15 second warm-up period. See instruction sheet covering switching actions for the various models of Multronic Capacitrols.

MAINTENANCE

(A) Do NOT oil or grease any part of the instrument at any time. Pivot and jewel construction is used for the meter movement.

(B) Check cold end or ambient meter setting regularly, as explained under "Adjustment and Checks Before Using".

(C) Inspect all terminal connections regularly, both thermocouple and control circuits.

(D) Be sure lead wire and thermocouple polarity is correct and wires are not damp or grounded or an error in reading will result. Only the hot junction of the thermocouple may be grounded.

(E) Inspect thermocouple regularly. Examine for signs of deterioration such as scaling or breaks. Replace thermocouple when these indications become more than a trace as accuracy may be effected. The protecting tube should be examined for leaks.

(F) Be sure the chassis and tubes are well inserted in their sockets.

(G) Check tuning adjustment as described under "Adjustments and Checks Before Using" and change or check tubes if proper control action is not obtained.

(H) Replace the Wheelco Capacitrol tubes yearly since the cost is little compared to possible service interruption.

(I) An inspection of the Wheelco Capacitrol tube may be made using a test meter (0-20 MA. DC). Insert phone tips into jacks provided in control chassis just to the right of the pilot bulb socket. The normal tube output is 10 MA. or higher when control is in the "ON" position and 2 MA. or lower when control is in the "OFF" position. Replace tube if these readings are not obtained.

(J) Both control chassis and tubes may be checked in the same manner. Tubes are interchangeable. Control chassis on Models 245P, 245AP and 245BP are interchangeable.

CHANGING LOCATION

(A) Replace the shunt wire or link at the (S) terminal on the under side of the meter or at (S) terminal on terminal strip as originally shipped to protect the meter during handling. Set red control pointers to top of scale.

(B) If possible use the same length extension lead wire of correct material when relocating the instrument.

(C) Up to 25 ft. increase or decrease in length of the extension lead wire is allowable without recalibrating the meter.

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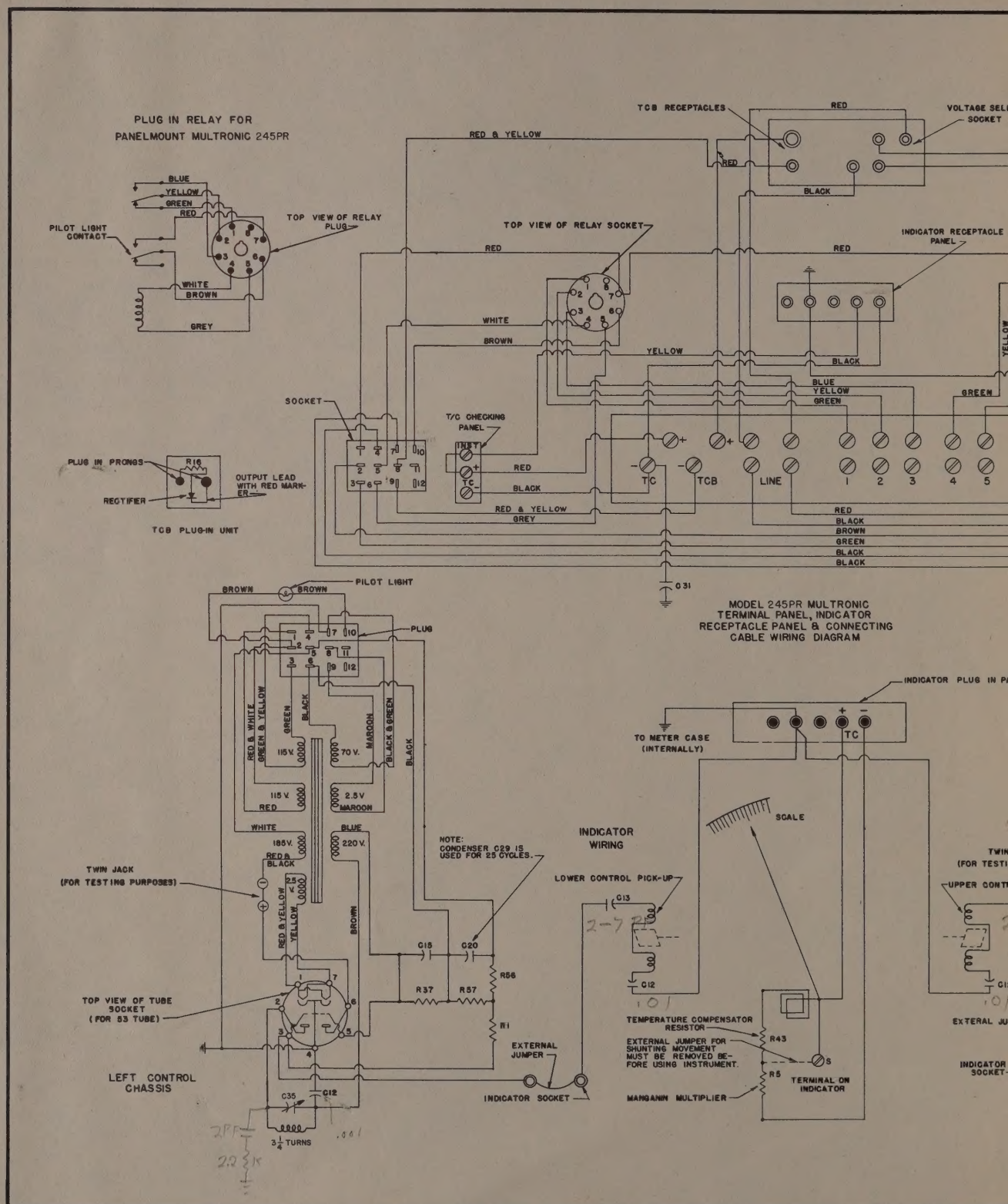
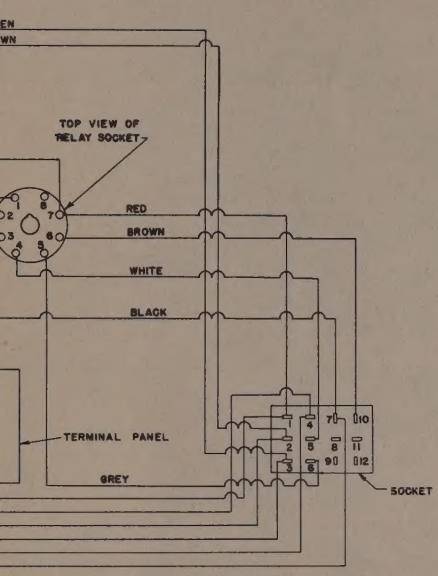
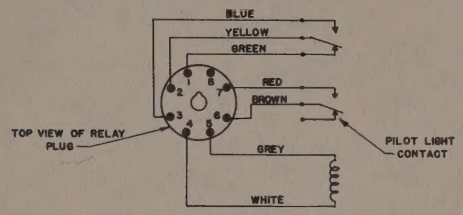
INTERNAL WIRING DIAGRAM—MODEL 245PR PA



ELMOUNT MULTRONIC CAPACITROL

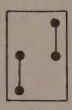


PLUG IN RELAY FOR
PANELMOUNT MULTRONIC 245PR



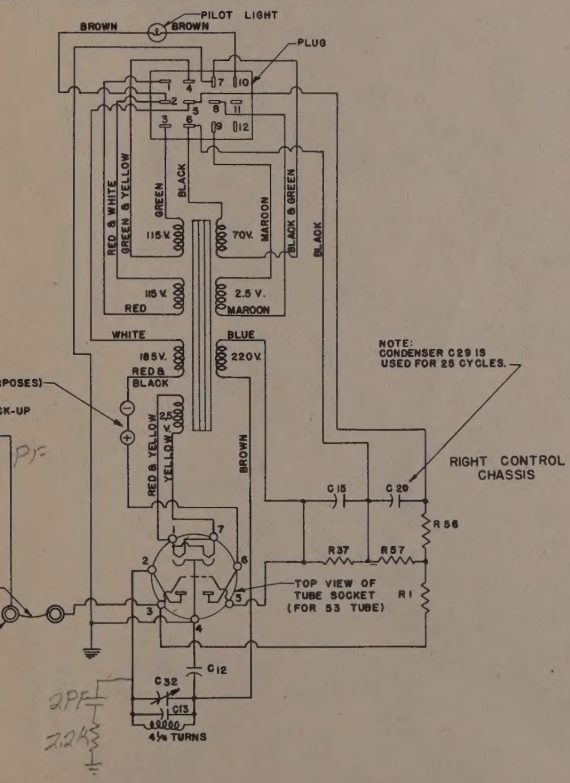
NOTES:

1. THERMOCOUPLE BREAK PROTECTION IS FURNISHED ONLY WHEN SPECIFIED BY CUSTOMER.
2. FOR 230 V. INSTRUMENT PLACE 230V. PLUG IN VOLTAGE SELECTOR SOCKET.
3. FOR 115V. INSTRUMENTPLACE 115 V. PLUG IN VOLTAGE SELEOTOR SOCKET.



PLUG CONNECTION FOR 115 V.

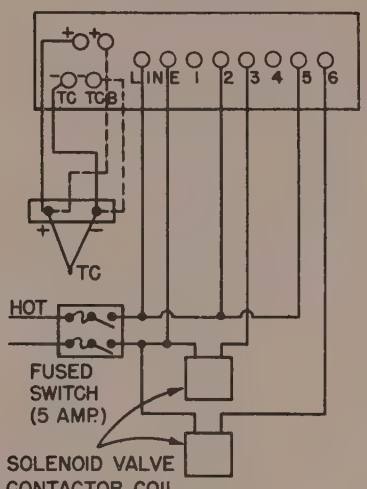
PLUG CONNECTIONS FOR 230 V.



Wheelco Model 245P Capacitrol

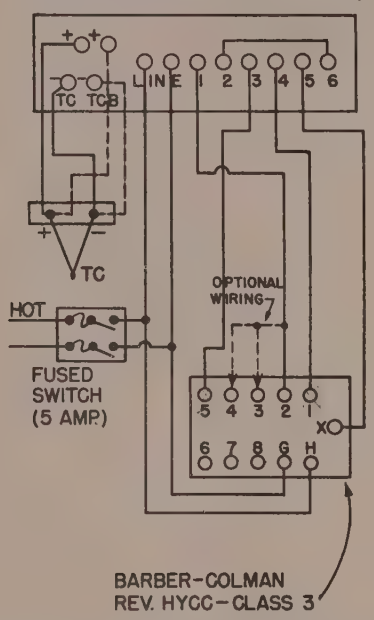
External Wiring Diagrams

HIGH-LOW CONTROL

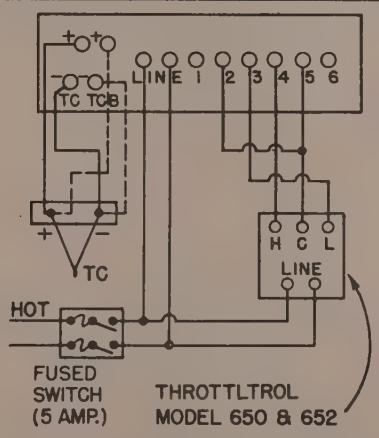


FUSE CONTACTOR LOAD
INDEPENDENT OF INSTRUMENT LOAD

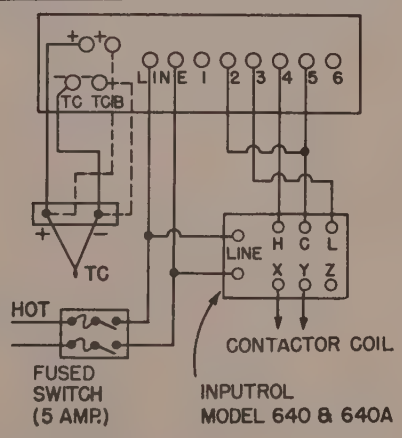
BARBER-COLMAN CONTROL MOTOR



MULTRONIC CAPACITROL WITH THROTTLTROL



MULTRONIC CAPACITROL WITH INPUTROL



NOTE:

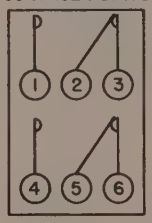
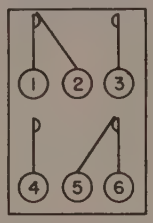
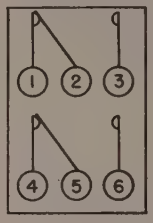
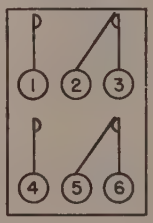
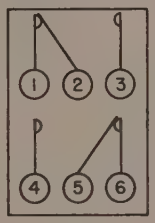
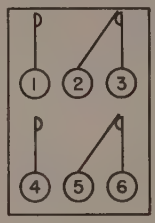
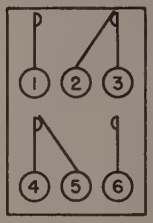
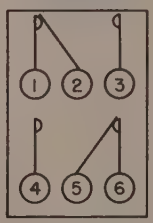
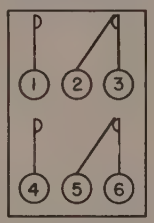
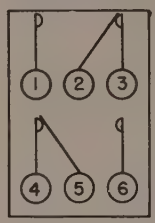
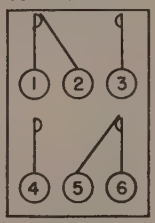
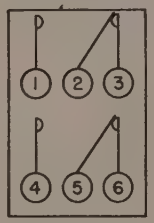
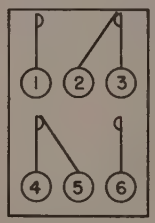
(1) USE COPPER WIRE (14 GA. SATISFACTORY) FOR TCB CONNECTIONS IF USED.

(2) INSTRUMENT CONTACT RATINGS: 10 AMP. AT 115 VOLTS — 5 AMP. AT 230 VOLTS NON-INDUCTIVE LOADING. FOR INDUCTIVE LOADS DECREASE RATING 50%.

(3) USE PROPER VOLTAGE PLUG TO CORRESPOND WITH SUPPLY.

(OVER)

Switching Actions For Wheelco Capacitrol Models 245P, 245AP, 245BP, and 245RP

MODEL NUMBER	POSITION OF INDICATOR
245P CONTROL DIFFERENTIAL SETTING AJUSTABLE FROM COINCISION TO APPROXIMATELY 10% OF SCALE RANGE OVER ENTIRE SCALE.	BELOW CONTROL POINTS  BETWEEN CONTROL POINTS  ABOVE CONTROL POINTS 
245AP SWITCHING ACTION WITH CONTROL DIFFERENTIAL SET GREATER THAN 10% OF SCALE RANGE. IF LESS THAN APPROXIMATELY 10% OF SCALE RANGE THE SWITCHING IS THE SAME AS FOR MODEL 245P.	BELOW CONTROL POINTS  AT LOWER CONTROL SETTING. ZONE APPROX. 5% ABOVE & BELOW CONTROL POINT  BETWEEN CONTROL POINTS  ABOVE CONTROL POINTS 
245BP CONTROL DIFFERENTIAL SETTING AJUSTABLE OVER ENTIRE SCALE. INDICATES BETWEEN APPROXIMATELY 5% BELOW LOWER CONTROL POINT TO APPROXIMATELY 5% ABOVE HIGH CONTROL POINT SETTINGS.	BELOW CONTROL POINTS  BETWEEN CONTROL POINTS  ABOVE CONTROL POINTS 
245RP CONTROL DIFFERENTIAL SETTING AJUSTABLE FROM COINCISION TO APPROXIMATELY 10% OF SCALE RANGE OVER THE ENTIRE SCALE.	BELOW CONTROL POINTS  BETWEEN CONTROL POINTS  ABOVE CONTROL POINTS 

NOTES:

(1) CONTROL ACTION SHOWN WITH INSTRUMENT POWERED.

(2) THE LOWER CONTROL SETTING IS CONNECTED TO TERMINALS 1, 2, & 3.

(3) THE HIGHER CONTROL SETTING IS CONNECTED TO TERMINALS 4, 5, & 6.

(4) CONTACT RATING: 10 AMPERES AT 115 VOLTS OR 5 AMPERES AT 230 VOLTS NON-INDUCTIVE LOADING. FOR INDUCTIVE LOADING DECREASE RATING 50%.

wheelco instruments division
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Instrumentality

F-5321-BK

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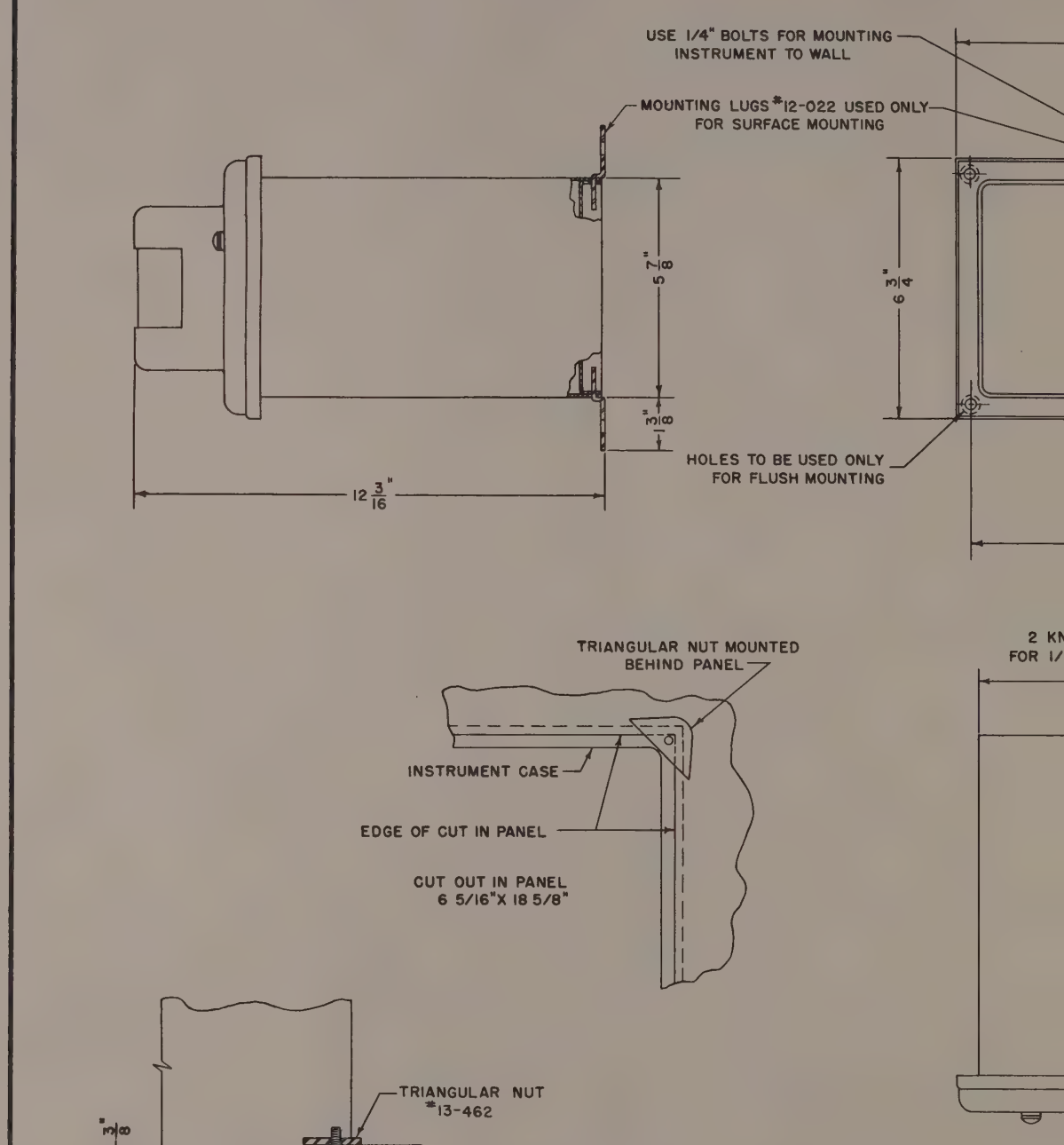
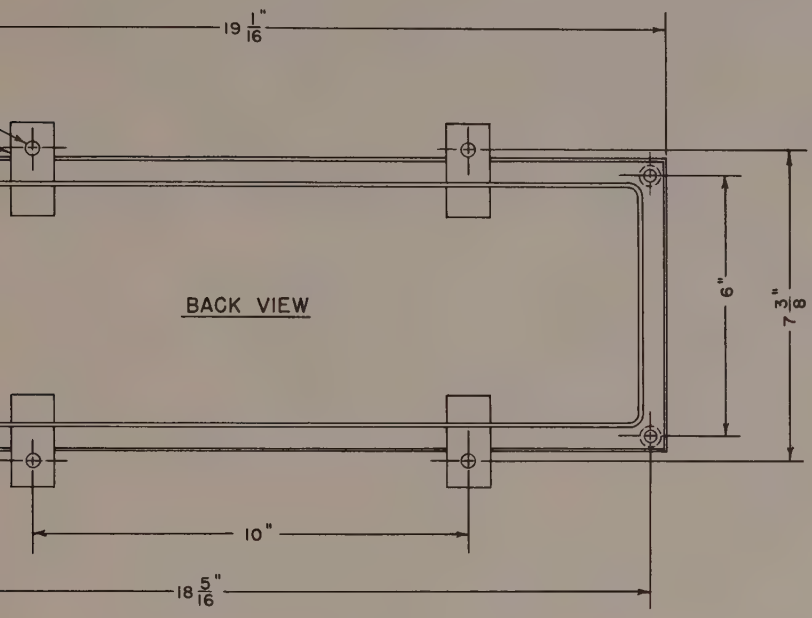
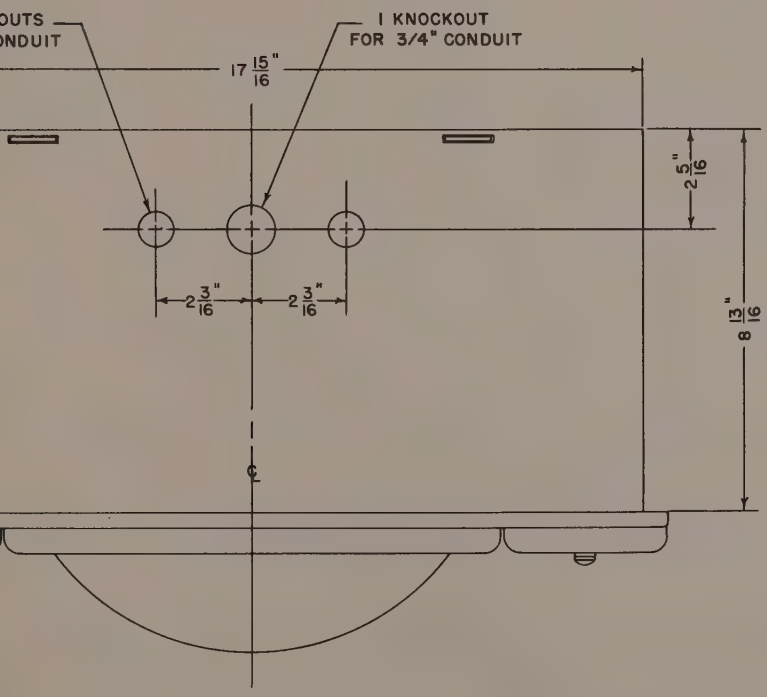
MOUNTING DIMENSIONS — PANELMOUNT MODELS



FLUSH MOUNTING DETAILS

241P, 245P, 251P, 252P, AND 741P





division

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LLINOIS, U. S. A.

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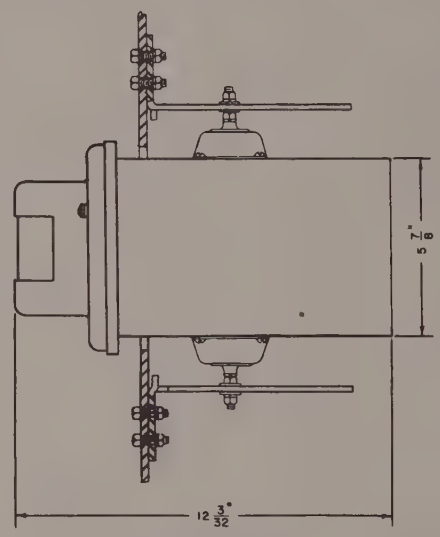
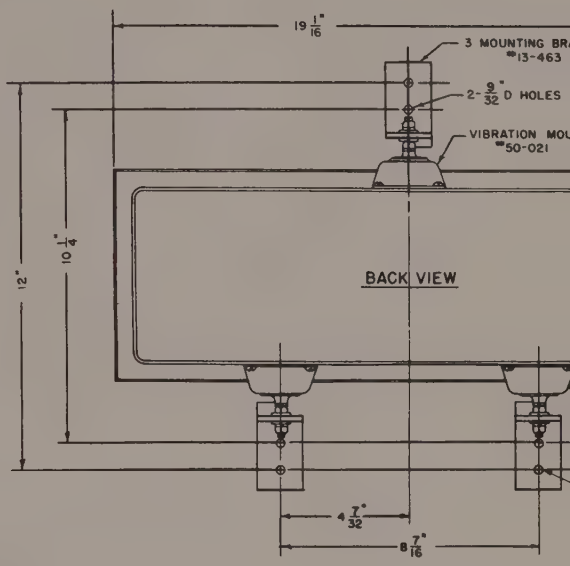
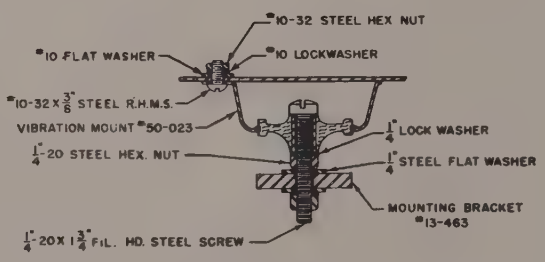
VIBRATION MOUNT
FOR PANELMOUNT I

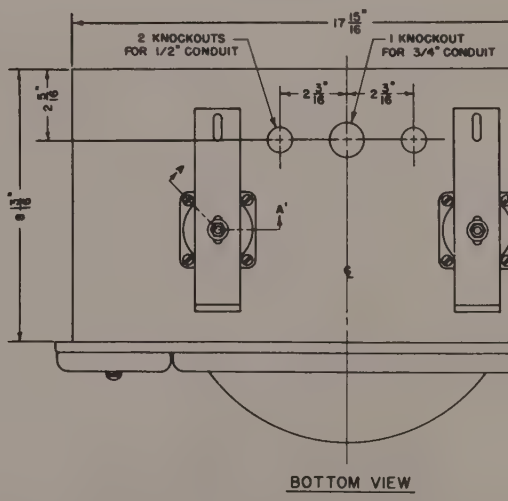


FLUSH MOUNTING





SECTION A-A'

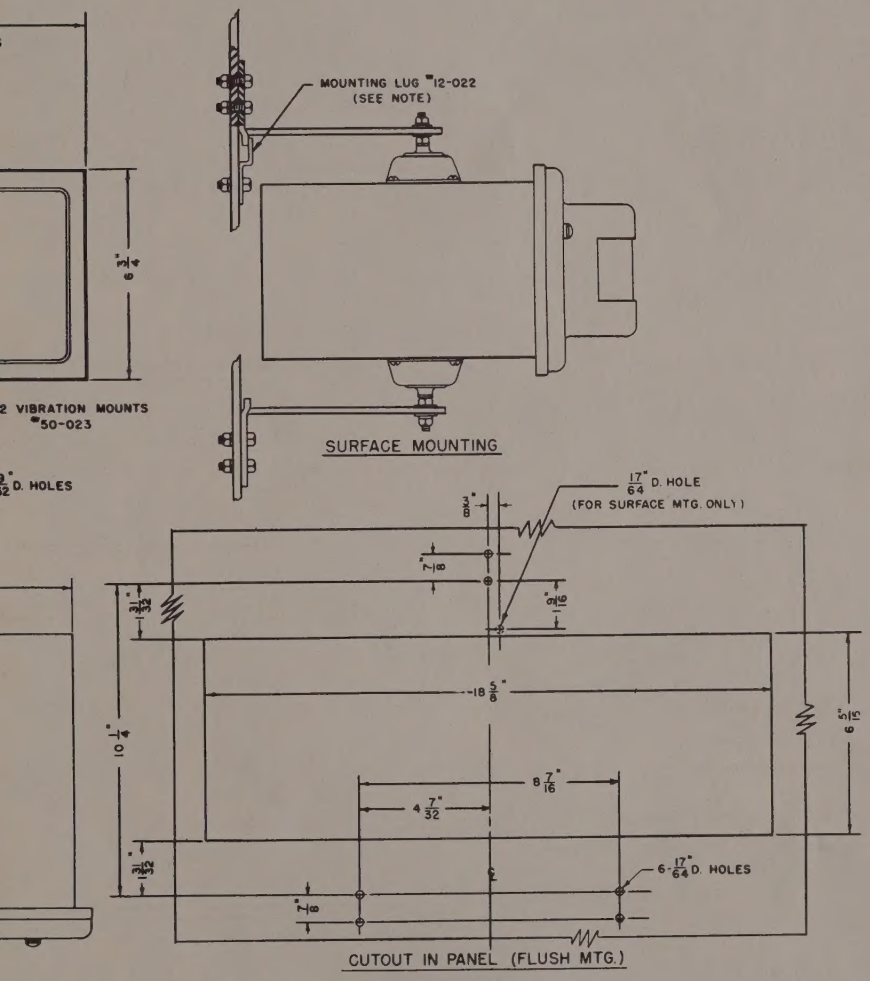


BOTTOM VIEW

wheelco instrument
BARBER-COLMAN COMPANY • ROCKFOR

INSTRUCTION SHEET NO. 5662A

KIT A1553
STRUMENTS



NOTE:
MTG. LUG #12-022 USED ONLY WHEN ADDITIONAL SUPPORT IS REQUIRED IN SURFACE MOUNTING AND WILL BE FURNISHED ONLY WHEN SPECIFIED BY CUSTOMER.

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